Balloon popper

1. Identify the forces acting on the Balloon Buster just before it is dropped.

1) _____

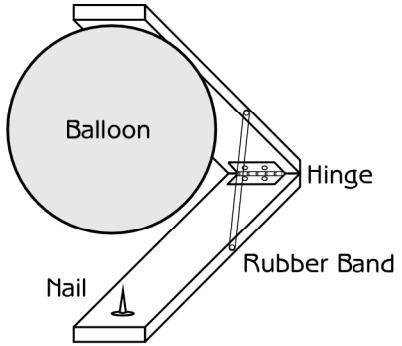
2) _____

3) _____

4) _____

5) _____

Hint: There may be less than five forces.



2. Air resistance has what kind of effect on the falling Balloon Buster?

a) Large
b) Medium
c) Small
d) Almost none

3. When or where in the fall does the balloon pop?

a) Right after it is released
b) Half way down
c) When it hits the ground or floor
d) The balloon does not pop

4. While it is falling, what force causes the Balloon Buster to close?

_____

_____

_____

5. Explain why the Balloon Buster does not close before it is dropped.

_____

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Balloon popper - explanation

▪**Identify the forces acting on the Balloon Buster just before it is dropped.**

A hand exerts a force on the top bar to keep the Balloon Buster from falling. Gravitational attraction is exerting a force on the entire apparatus and balloon, pulling them downward. The gravitation force on the lower arm causes it to stretch the rubber band, generating an internal force, which tends to hold the lower arm up.

▪**Air resistance has what kind of effect on the falling Balloon Buster?**

▪ **(**d) almost none because the balloon pops before the apparatus gains any significant speed through the air

▪**When or where in the fall does the balloon pop?**

(a) Right after it is released

The rubber band exerts an internal force which pulls the two arms together. Without the retarding force of the hand holding the upper arm, the rubber band snaps the two arms together, popping the balloon.

▪**While it is falling, what force causes the Balloon Buster to close?**

The internal force caused by the stretched rubber band.

▪**Explain why the Balloon Buster does not close before it is dropped.**

The hand holds the upper arm while gravity pulls the lower arm downward.

Try it yourself!

▪**Build your own Balloon Buster**

The main framework is made from two pieces of hardwood (to withstand repeated drops), a hinge, and two screws. Each hardwood piece is about 5 cm by 2 cm and about 30 cm long. Pins or sharp nails can be held in place with a rubber lab stopper. The balloon neck is held in place with a smooth V-shaped slot or a spring-type clothes pin. A screw is put in the side of the upper and lower arms but not screwed in flush with the wood to provide a place for the rubber band to be inserted. The rubber band should be of sufficient strength when stretched to nearly balance the weight of the lower arm before dropping.